REMARKS

Claims 1-24 were previously pending in this application. Claim 1 has been amended. Support for this amendment may be found at least on page 9, lines 23-25, and in Fig. 1. New claim 25 has been added. As described in more detail below, support for this new claim may be found at least in the Background section and in the Example section. As a result, claims 1-25 are pending for examination with claims 1, 13, 14, and 25 being independent claims. No new matter has been added.

Telephone Interview with the Examiner

Applicants wish to thank Examiner Ludlow for the opportunity to conduct a telephone interview with Maria A. Trevisan and Shannon Pratt on July 6, 2004. During the interview, the claim rejections in view of the Castro reference were discussed. Also discussed was the claim concept featured in new claim 25. The substance of the discussion is incorporated into the following remarks.

Double Patenting Rejection

The Examiner has provisionally rejected claims 1-24 under the judicially created doctrine of obvious-type double patenting as being unpatentable over claim 3-7 and 9-12 of co-pending Application No. 09/875,779. However, this is the application number for the present case. During a telephone discussion with Maria A. Trevisan to clarify the rejection, Examiner Ludlow instructed Applicants to disregard the rejection. Accordingly, withdrawal of this rejection is respectfully requested.

Allowable Subject Matter

Applicants acknowledge the Examiner's finding that claims 5, 7 and 8 would be allowable if rewritten in independent form to include all of the limitations of their respective base claims and any intervening claims. Applicants have not rewritten the allowable claims in independent form, since they depend from claims believed to be allowable, as discussed below.

Amendments to the Specification

Applicants have amended the specification to correct minor typographical errors. Support for each amendment may be found preceding each replacement paragraph. No new matter has been added.

Claim Rejections – 35 U.S.C. § 102(e)

Gilmanshin

The Examiner rejected claims 1-4 and 9-24 under 35 U.S.C. §102(e) as being anticipated by Gilmanshin et al. (U.S. Patent No. 6,263,286). Applicants respectfully traverse these rejections.

As amended, independent claim 1 is directed towards a method for determining the velocity of an elongated polymer through a device comprising, *inter alia*, defining at least one detectable region on the polymer, and causing relative movement of the elongated polymer through a plurality of linearly sequential detection zones, each separated a predetermined distance, to produce a plurality of signal amplitude profiles. Each signal amplitude profile is produced at a different detection zone, and includes data acquired before, during, and after each interaction. The method further comprises measuring each of the signal amplitude profiles in a time-correlated manner, and analyzing the measurements to determine the velocity of the polymer.

Gilmanshin discloses a method of analyzing polymers. Although Gilmanshin teaches a method of determining velocity, Gilmanshin does not teach using *a plurality of linearly sequential detection zones*, as recited in claim 1. When Gilmanshin discusses determining velocity, only *one* detection zone is utilized in the device. For example, in Col. 14, Gilmanshin discloses a method of calculating the velocity of a molecule based upon a known length of the molecule. In that embodiment the reference teaches that, "since the distance between labels on the control molecule is the length of the molecule, which is known in this embodiment, the autocorrelation function analysis determines the velocity of the DNA molecule based on the

amount of time required for the two FRET events to occur that correspond to the ends of the molecule passing the station." (Gilmanshin Col. 14, lines 19-25).

In the Office Action, the Examiner asserts that Gilmanshin teaches a method of determining the velocity of a DNA molecule by passing the molecule past fluorescence-modifying stations and measurement of fluorescence profiles, and points to Col. 14, lines 30-47. However, this particular section of Gilmanshin again refers to labeled end units on the molecule passing through *one* station to detect the velocity. The velocity is determined by dividing the known length of the molecule by the time it takes for the station to detect the labeled ends of the molecule. Gilmanshin provides no teaching of employing *more than one* detection zone in a given device to determine the velocity of an object. Thus, claim 1 patentably distinguishes over Gilmanshin, such that the rejection under §102 should be withdrawn.

Claims 2-4, 9-12, 15, 18, and 22 depend from claim 1 and are patentable for at least the same reasons.

Independent claim 13 is directed towards a method of determining the length of an elongated polymer. Independent claim 14 is directed towards a method of determining the distance between first and second landmarks on an elongated polymer. Both claims 13 and 14 recite methods comprising the step of, *inter alia*, causing relative movement of the elongated polymer through first and second detection zones, the zones being linearly spaced apart by a predetermined distance.

As discussed above, Gilmanshin does not disclose *relative movement through a first and second detection zone*, where the zones are linearly spaced apart by a predetermined distance, as recited in claims 13 and 14. Thus, claims 13 and 14 patentably distinguish over Gilmanshin, such that the rejection under §102 should be withdrawn.

Claims 16, 17, 19, 20, 21, 23, and 24 depend from claim 13 or 14 and are patentable for at least the same reasons.

Castro

Claims 1-4, 6, 9-12, 15, 18, and 22 stand rejected under 35 U.S.C. §102(e) as being anticipated by Castro (Anal. Chem 1995 vol. 67 3181-3186). Applicants respectfully traverse these rejections.

Independent claim 1 is discussed above.

Castro discloses a technique to determine the *electrophoretic* velocities of molecules by measuring the time required for individual molecules to travel a fixed distance between two laser beams. Molecules, such as DNA fragments of varying sizes in a sample solution, are placed within a capillary cell. A sieving media, such as hydroxypropylmethyl cellulose, is added to enable capillary electrophoresis separation of the DNA. The larger DNA fragments are retarded by the sieving media to a greater extent than are the smaller fragments. Accordingly, the smaller DNA fragments travel through the media faster than the larger fragments. In one embodiment, the DNA is intercalated with a fluorescent dye, such that when the DNA fragments travel past each laser beam, a fluorescence burst is observed. In another embodiment, a mixture of two fluorescent proteins is analyzed because the proteins naturally fluoresce.

In the Office Action, the Examiner asserts that Castro teaches a method of determining the velocity of DNA and proteins using fluorescent measurement at two detectors spaced apart in a flow path. As discussed during the interview, unlike the present invention, Castro does not determine the velocity of an *elongated* polymer. Castro does not refer to any denaturing process to encourage elongation of the molecules, either when using nucleic acids or proteins. Furthermore, Castro simulates detection of a single fluorphor on a polymer and then states that experimentally the measurement will be more efficient based on multiple labeling of polymers. The reference further indicates that movement of "individual molecules" was detected at each of the two laser beams. Together, these teachings indicate that Castro is detecting a nucleic acid or protein in its entirety. Castro does not need to analyze individual regions within a polymer at least because Castro is interested in separating individual polymers from each other. There would be no need for Castro to *elongate* the separated polymers based on the ultimate goal of separating polymers from each other.

In fact, some of the embodiments disclosed in Castro teach away from employing elongated polymers. As discussed above, in one embodiment disclosed in Castro, inherently fluorescing proteins are used (i.e. phycoerythrin). While phycoerythrin inherently fluoresces when in its native secondary structure, it most probably does not inherently fluoresce (and thus cannot be detected) when elongated via denaturation.

The instant application teaches various methods of elongating polymers, and also references co-pending application Serial No. 09/636,793. (See page 18, lines 2-4 and 7.)

Accordingly, Castro provides no teaching for determining the velocity of an *elongated polymer*. Claim 1 patentably distinguishes over Castro, and the rejection under section 102 should be withdrawn.

Claims 2-3, 6, 9-12, 15, 18, and 22 depend from claim 1 and are patentable for at least the same reasons.

New Claim

Applicants have added new independent claim 25 to further define one aspect of the invention. New claim 25 is believed to be allowable for at least the foregoing reasons.

Independent claim 25 is directed towards a method for determining the velocity of an *elongated* polymer. Claim 25 is similar to independent claim 1, except that claim 25 further includes the limitation of causing relative movement of the elongated polymer *by an effect other than electrophoresis*, to move the elongated polymer through a plurality of linearly sequential detection zones.

As discussed during a telephone interview, claim 25 further distinguishes from Castro because Castro teaches molecule movement due to an *electrophoretic* effect. Castro requires capillary electrophoresis to separate DNA fragments based on size. Unlike Castro, electrophoresis is not required to perform the claimed invention.

Support for new claim 25 can be found at least in the background section which distinguishes the claimed invention from prior art electrophoretic methods (see pages 1-4) and in the examples (see pages 25-26) where a free solution for polymer analysis is taught (as compared to Castro's dependence on a sieving media). Castro further teaches away from the use of a free solution by teaching that separation of DNA fragments of different size in free solution is impossible. (Castro, page 3183).

Accordingly, claim 25 distinguishes from Castro by causing relative movement of the *elongated polymer by an effect other than electrophoresis*.

CONCLUSION

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicant's attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,

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